CLAIMS

I claim:

1. A method for preventing cell loss during switch-over in a redundant switch fabric comprising the steps of:

    receiving an inbound cell in an ingress buffer;

    dispatching copies of said inbound cell stored in said ingress buffer to a plurality of switch fabric elements;

    receiving said cell copies in said plurality of switch fabric elements;

    forwarding an outbound cell from a designated active switch fabric element to an egress buffer;

    receiving a redesignation of the active switch fabric element during switch over;

    forwarding an outbound cell from the redesignated active fabric switch element to the egress buffer; and

    dispatching an outbound cell from the egress buffer;

2. The method of Claim 1 wherein the step of receiving an inbound cell into an ingress buffer comprises the steps of:

    receiving a datagram from a physical interface;

    segmenting the datagram into a cell; and

    forwarding the cell to the ingress buffer.

3. The method of Claim 2 further comprising the step of attaching a cell sequence number to said cell and then storing the sequence number in the ingress buffer.

4. The method of Claim 1 wherein the step of dispatching copies of the inbound cell stored in the ingress buffer to a plurality of switch fabric elements comprises the steps of:

    selecting said inbound cell from the ingress buffer;

5   replicating said cell into a plurality of copies; and

    sending said cell copies to a plurality of switch fabric elements.

5. The method of Claim 1 wherein the step of dispatching an outbound cell from the egress buffer comprises the steps of:

10   determining whether there is a gap or an overlap in the contents of the egress buffer relative to a cell stream arriving from a newly designated active switch fabric element;

    if there is an overlap in the egress buffer, adjusting a read pointer for the egress buffer to accommodate the overlap;

15   if there is a gap in the egress buffer, dispatching a cell from the ingress buffer so as to send copies of the cell to the plurality of switch fabric elements again to prevent the loss of the cell; and

    dispatching the cell received from the egress buffer after it is adjusted for any gap or overlap.

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6. The method of Claim 5 wherein the step of determining whether there is a gap or an overlap in the contents of the egress buffer is accomplished by either comparing the contents of the cells arriving from the newly designated active switch fabric to cells stored in the egress buffer or by

25   examining a cell sequence number attached to a cell arriving from the newly designated active switch fabric to a cell sequence number attached to a cell stored in the egress buffer.

7. The method of Claim 1 wherein the step of dispatching an outbound cell

30   from the egress buffer further comprises the steps of:

selecting an outbound cell from the egress buffer;

reassembling said outbound cell into a datagram; and

conveying the datagram to a physical interface.

5   8. The method of Claim 7 wherein the step of reassembling outbound cells into datagrams comprises the steps of:

creating a storage element for each datagram to be concurrently reassembled for each priority level for each router port to be serviced;

receiving an outbound cell from the egress buffer and storing said

10   outbound cell into a storage element wherein the storage element is selected according to the datagram that it is assigned to, the priority level of the cell and the destination router port; and

dispatching the datagram to a physical interface once all cells to the datagram are received in the storage element.

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9. A redundant switching system comprising:

plurality of switch fabric elements that accept inbound cells and direct those cells to output ports as outbound cells;

input line card comprising:

20   ingress buffer;

cell replicator that receives inbound cells from the ingress buffer and forwards copies of said inbound cells to the plurality of switch fabric elements;

integrity manager that monitors the health of the plurality of switch

25   fabric elements and designates an active switch fabric element and upon detecting an error in the active switch fabric element designates a different switch fabric element as the active switch fabric element and issues an active switch signal that indicates what switch fabric matrix is currently active;

30   output line card comprising:

egress buffer;

cell receiver that accepts outbound cells from a plurality of switch fabric elements and selects a cell from a switch fabric matrix based on the active switch signal received from the integrity manager and forwards that cell to the egress buffer; and

cell dispatch unit that retrieves cells from the egress buffer and dispatched said cells to external interfaces.

10. The redundant switching system of Claim 8 wherein the input line card further comprises:

physical interface that receives datagrams from external sources;

segmentation unit that segments datagrams into cells of fixed length; and

cell manager that stores cells in the ingress buffer.

11. The input line card of Claim 9 further comprising:

cell sequence numbering unit that attaches a cell sequence number to a cell; and

ingress buffer that stores the cell with sequence number.

12. The redundant switching system of Claim 8 wherein input line card further comprises:

cell selection unit that selects an inbound cell from the ingress buffer;

replicating unit that replicates the inbound cell selected by the cell selection unit into a plurality of copies; and

dispatch unit that sends the cell copies to a plurality of switch fabric elements.

13. The redundant switching system of Claim 8 wherein output line card further comprises:

egress buffer content manager that:

determines whether there is a gap or overlap in the contents of the egress buffer relative to cells arriving from a newly designated active switch fabric element;

adjusts a read pointer for the egress buffer to accommodate the overlap if there is the overlap; and

issues a gap detection signal when a gap is detected;

commanding unit that, upon receiving a gap detection signal from the egress buffer manager, requests the ingress buffer to send copies of cells corresponding to the length of the gap to the plurality of switch fabric elements again to prevent the loss of the cell copies if there is a gap in the egress buffer; and

dispatching unit that forwards a received cell from the egress buffer after it has been adjusted for any gap or overlap.

14. The redundant switching system of Claim 8 wherein the output line card further comprises:

selecting unit that selects an outbound cell from the egress buffer.

reassembling unit that reassembles the outbound cell into a datagram; and

dispatching unit that conveys the datagram to a physical interface.

15. The redundant switching system of Claim 8 wherein the output line card yet further comprises:

receiving unit that receives an outbound cell from egress buffer;

storage element for each datagram to be concurrently reassembled for each priority level for each router port to be served that stores the outbound cell wherein storage element is selcted according to the

datagram that it is assigned to, the priority level of the cell and the destination router port; and

dispatching unit that forwards all cells to the datagram received in the storage element to a physical interface.

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16. The redundant switching system of Claim 8 wherein the integrity manager further comprises:

monitoring element that monitors health of a plurality of switch fabric elements;

10   controlling element that designates an active switch fabric element and upon detecting an error in the active switch fabric element designates a different switch fabric element as the active switch fabric element, and

signaling element that issues an active switch signal that indicates

15   what switch fabric matrix is currently active.

17. An input line card comprising:

ingress buffer; and

cell replicator that receives inbound cells from the ingress buffer

20   and forwards copies of said inbound cells to the plurality of inbound cell interfaces.

18. The input line card of Claim 17 further comprising an input network processor that, upon receiving a command, will adjust a read pointer to

25   the ingress buffer in order to cause the ingress buffer to retransmit cells to the cell replicator.

19. An output line card comprising:

egress buffer;

interface selection unit comprising a plurality of outbound cell interfaces and that selects a cell stream from one of said outbound cell interfaces according to an external indicator and directs the cells from the selected cell stream into the egress buffer; and

5   cell dispatch unit that retrieves cells from the egress buffer and dispatches said cells to external interfaces.

20. The output line card of Claim 18 further comprising an output network processor that determines the synchronization of a cell stream selected 10 by the interface selection unit to cells stored in the egress buffer by either comparing the contents of the cells or by organizing cells according to a cell sequence number.

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